ONTARIO MINISTRY OF ENVIRONMENT
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OPERATING SUMMARY

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MINISTRY OF THE ENVIRONMENT

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1972
MOE

RICHMOND HILL

1972

TD
367
.A56
R53
1972

Richmond Hill : water pollution control plant.

81837

Ontario

Ministry of the
Environment

135 St. Clair Avenue West
Toronto 195, Ontario

We are pleased to present you with the 1972 operating summary for the water pollution control plant serving your community.

This summary contains data on the performance of the plant as well as relevant financial information. Of particular interest is the review of the year's activities in which significant items of these data are discussed in some detail by the operations engineer and his staff who, by their day-to-day involvement with the operation, are thoroughly familiar with the plant.

We appreciate your continuing interest in protecting the environment through the efficient operation of this wastewater treatment facility.

D.S. Caverly,
Assistant Deputy Minister.

D.A. McTavish, P. Eng.,
Director,
Project Operations Branch.

MINISTRY OF THE ENVIRONMENT

MINISTER
Honourable James A.C. Auld

DEPUTY MINISTER
E. Biggs

ASSISTANT DEPUTY MINISTER
D.S. Caverly

EXECUTIVE DIRECTOR
K.H. Sharpe

PROJECT OPERATIONS BRANCH

DIRECTOR
D.A. McTavish

ASSISTANT DIRECTOR
C.W. Perry

REGIONAL SUPERVISOR
P.J. Osmond

OPERATIONS ENGINEER
A. Clark

135 St. Clair Avenue West
Toronto 195

RICHMOND HILL

WATER POLLUTION CONTROL PLANT

operated for

THE TOWN OF RICHMOND HILL

by the

MINISTRY OF THE ENVIRONMENT

1972 ANNUAL OPERATING SUMMARY

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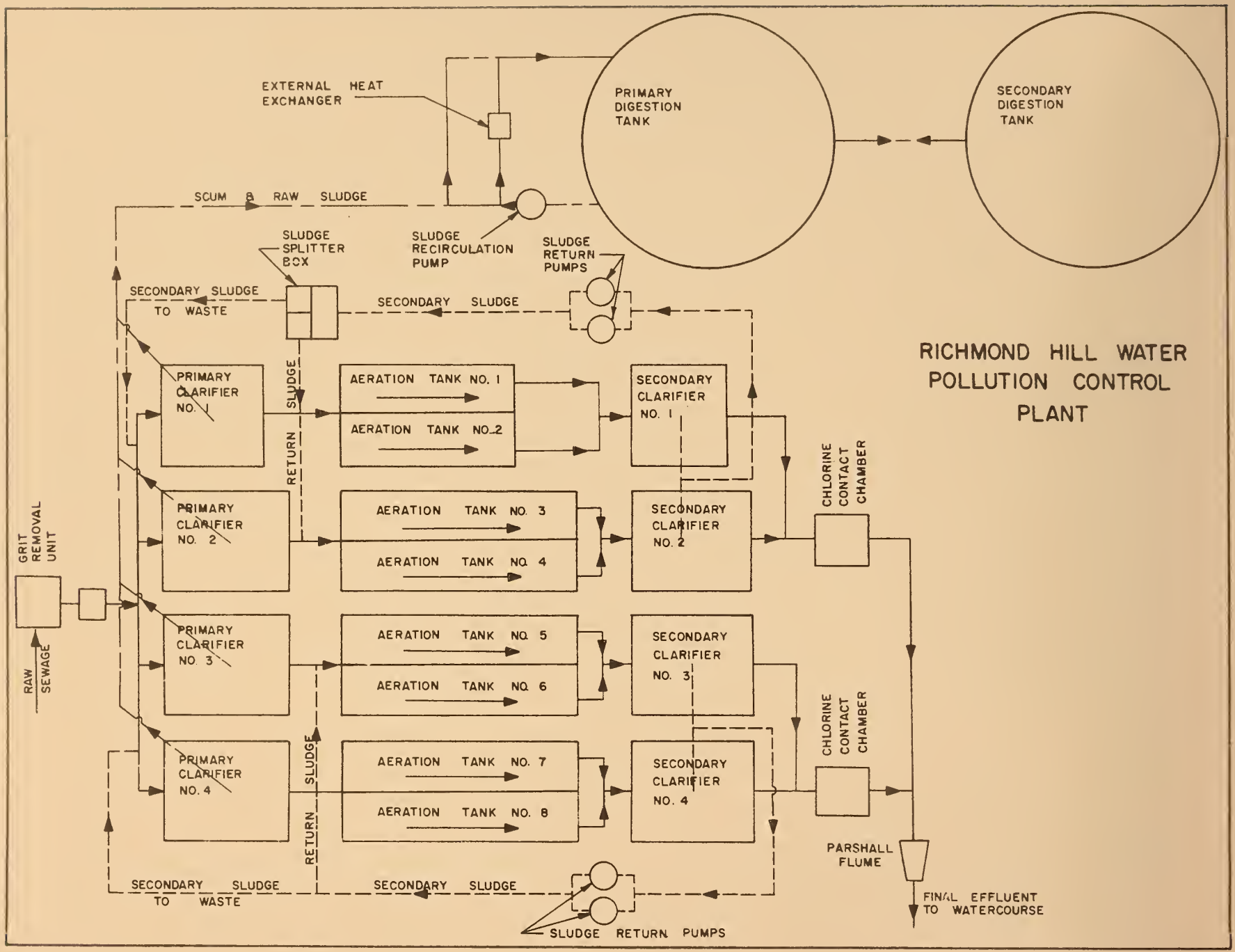

EXTERNAL HEAT EXCHANGER
PRIMARY DIGESTION TANK
SECONDARY DIGESTION TANK
SCUM & RAW SLUDGE
SLUDGE SPLITTER BOX
SLUDGE RECIRCULATION PUMP
SLUDGE RETURN PUMPS
SECONDARY SLUDGE TO WASTE
SECONDARY SLUDGE
RICHMOND HILL WATER POLLUTION CONTROL PLANT
PRIMARY CLARIFIER NO. 1
SLUDGE
RETURN
AERATION TANK NO. 1
AERATION TANK NO. 2
SECONDARY CLARIFIER NO. 1
CHLORINE CONTACT CHAMBER
GRIT REMOVAL UNIT
PRIMARY CLARIFIER NO. 2
AERATION TANK NO. 3
AERATION TANK NO. 4
SECONDARY CLARIFIER NO. 2
RAW SEWAGE
PRIMARY CLARIFIER NO. 3
AERATION TANK NO. 5
AERATION TANK NO. 6
SECONDARY CLARIFIER NO. 3
CHLORINE CONTACT CHAMBER
PRIMARY CLARIFIER NO. 4
AERATION TANK NO. 7
AERATION TANK NO. 8
SECONDARY CLARIFIER NO. 4
PARSHALL FLUME
FINAL EFFLUENT TO WATERCOURSE
SECONDARY SLUDGE TO WASTE
SECONDARY SLUDGE
SLUDGE RETURN PUMPS

DESIGN DATA

PROJECT NO.	2-0006-57
TREATMENT	Activated Sludge
DESIGN FLOW	1.60 mgd
DESIGN POPULATION	16,000
BOD - Raw Sewage	200 mg/l
- Removal	90%
SS - Raw Sewage	220 mg/l
- Removal	95%

PRIMARY TREATMENT

Grit Removal

Type: Aerated
Size: One 15½' x 6' x 9' swd (5,220 gal)
Retention: 4.7 min

Primary Sedimentation

Type: Dorr
Size: One 16' dia x 10' swd
One 26' dia x 10' swd
Two 26' dia x 9.7' swd
(110,000 gal)
Retention: 1.65 hr
Loading: Surface, 908 gal/ft^2/day
Weir, 4880 gal/ft/day

SECONDARY TREATMENT

Aeration Tanks

Type: Diffused air; single-pass
Size: Two 58' x 9' x 9'
Two 81' x 14½' x 10¼'
Four 81' x 14½' x 9 1/3'
(482,700 gal)
Retention: 7.2 hr

Diffusers

- Carborundum diffusers

Air Supply

a) Type: Standaire (C.P.)
Size: One 400 scfm
Two 510 scfm

b) Type: Sutorbilt
Size: One 1,000 scfm

Secondary Sedimentation

Type: Dorr
Size: One 19' dia x 10' swd
One 30' dia x 10' swd
Two 30' dia x 9.7' swd
(147,180 gal)
Retention: 2.21 hr
Loading: Surface, 667 gal/ft^2/day
Weir, 4120 gal/ft/day

CHLORINATION

Type: W & T
Size: One 200 lb/day

Chlorine Contact Chamber

Size: Two 25' x 10' x 8' (25,000 gal)
Retention: 22½ min

OUTFALL

- to German Mills Creek

SLUDGE HANDLING

Digestion System - two-stage

Primary --
Type: Walker, 1 draft tube
Size: One 50' dia x 20' swd (39,200 ft^3 or 0.245 mil gal)

Secondary--
Type: Dorr (has one draft tube)
Size: One 30' dia x 19' swd (13,400 ft^3 or 83,500 gal)

'72 Review

GENERAL

This project consists of three connected activated sludge plants of differing capacities, constructed at different times and an 85 foot diameter storm flow and equalizing tank, operated on a fill and draw basis to curtail by-passing during periods of high flow. That portion of the flow which the plant cannot process during high flow periods is by-passed to the storm tank and returned to the plant for processing during periods of low flows. The plant effluent discharges into the German Mills Creek and represents the major portion of the creek flow in dry weather conditions.

A continuous program to repair and/or replace outdated or defective equipment was in progress throughout the year. Some major items installed were a new flow meter, a new blower, a new chlorine room and a new storage garage. Electrical and mechanical repairs were made to the primary and secondary clarifiers of the number one plant. Additional renovations to the plant were in progress at the end of the year. Improvements to the plant grounds were also underway during the year.

PLANT FLOWS AND CHLORINATION

Compared with the 1971 total flow reported in the 1971 annual report, there was a noticeable decrease in the total flow to the plant in 1972. A meter recalibration early in 1972 however indicated that the 1971 flows were high by a factor of approximately 1.3. Therefore comparing the 1972 flow of 663 million gallons to a corrected 1971 total flow of approximately 665 million gallons, the flow did not decrease noticeably from 1971 to 1972.

The average daily flow to the plant was 1.8 million gallons, the maximum daily flow to the plant was 2.7 million gallons and the maximum rate of flow to the plant was 3.0 million gallons per day. The daily flow to the plant exceeded the design capacity of the plant approximately 70 percent of the time.

A total of 41,500 pounds of chlorine was used during the year. An average dosage of 6.3 mg/l was applied to the effluent in the chlorine contact chamber to maintain an 0.5 mg/l residual.

PLANT EFFICIENCY

The influent BOD and suspended solids averaged 156 mg/l and 306 mg/l respectively. The effluent BOD and suspended solids both averaged 9 mg/l. These figures represent an average reduction of 94 percent BOD and 97 percent suspended solids.

Total phosphorus removal for the year averaged 50 percent.

SLUDGE DIGESTION AND DISPOSAL

After repairs were made to the digester, normal start-up problems were experienced. Raw sludge was hauled until September at which time the digester was producing digested sludge on a continuous basis.

A total of 5,260,000 gallons of raw sludge containing 4.5 percent total solids was pumped to the digester during the year. A sludge contractor hauled 3,150,335 gallons of raw and digested sludge from the plant for disposal on land. The total amount of digested sludge removed was somewhat ambiguous since at times it was necessary to haul both raw and digested sludge simultaneously during the digester start-up.

CONCLUSIONS

The town-owned Baiff water pollution control plant was nearing completion at the end of the year. When that plant commences normal operation, a portion of the total flow should be diverted from this plant. However, with additional residential construction in the Town, the diversion of flows may not result significantly in a decrease in the average daily flow.

With the resumption of a normal digester operation and a better regulation of the plant flow by making use of the flow equalizing tank, the plant operated at a high degree of efficiency. At the end of the year, the equalizing tank failed structurally and by press time had not been rebuilt, thus putting considerable strain on the remaining facilities.

PROJECT COSTS

2-0006-57

NET CAPITAL COST	$359,420.34
DEDUCT - Portion financed by	-
Long Term Debt to MOE	$359,420.34
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1972	$145,925.38
Net Operating	$ 95,202.77
Debt Retirement	2,214.00
Reserve	1,455.36
Interest Charged	20,155.92
TOTAL	$119,028.05

RESERVE ACCOUNT

Balance @ January 1, 1972	$ 21,843.52
Deposited by Municipality	1,455.36
Interest Earned	1,341.88
	$ 24,640.76
Less Expenditures	8,141.86
Balance @ December 31, 1972	$ 16,498.90

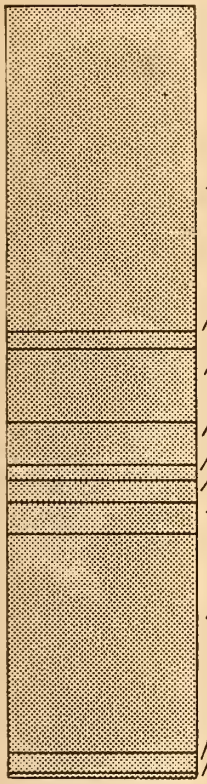
PROJECT COSTS

2-0256-68 NET CAPITAL COST	$271,250.59
DEDUCT - Portion financed by CMHC (Final)	(182,069.00)
Long Term Debt to MOE	$ 89,181.59
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1972	$ 1,490.29
Net Operating	$
Debt Retirement	1,339.00
Reserve	2,243.00
Interest Charged	21,305.88
TOTAL	$ 24,887.88

RESERVE ACCOUNT

Balance @ January 1, 1972	$ 187.00
Deposited by Municipality	2,243.00
Interest Earned	61.37
	$ 2,491.37
Less Expenditures	-
Balance @ December 31, 1972	$ 2,491.37

1972 COSTS

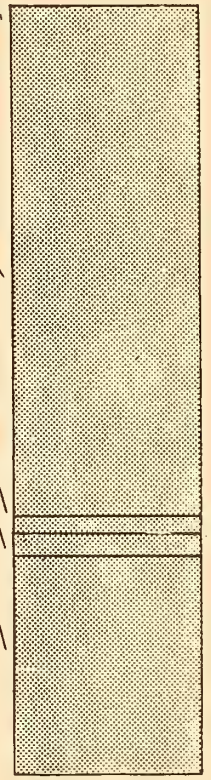


OPERATING COSTS

PAYROLL	42 %
FUEL	2 %
POWER	8 %
CHEMICALS	6 %
GENERAL SUPPLIES	2 %
EQUIPMENT	4 %
REPAIRS & MAINTENANCE	4 %
SUNDRY	28 %
WATER	2 %
TRAVEL	<1 %

TOTAL ANNUAL COST

NET OPERATING	66 %
DEBT RETIREMENT	2 %
RESERVE	3 %
INTEREST	29 %



YEARLY OPERATING COSTS

YEAR	SEWAGE TREATED in million gallons	TOTAL OPERATING COSTS	TREATMENT COSTS	
			$ per million gal	¢ per lb BOD
1968	704.89	53,637.43	76.09	6 cents
1969	769.7	60.794.64	78.98	7 cents
1970	822.5	78,533.04	95.50	8 cents
1971	865.	76,760.00	88.70	4 cents
1972	663.0	95,202.77	143.60	10 cents

MONTHLY OPERATING COSTS

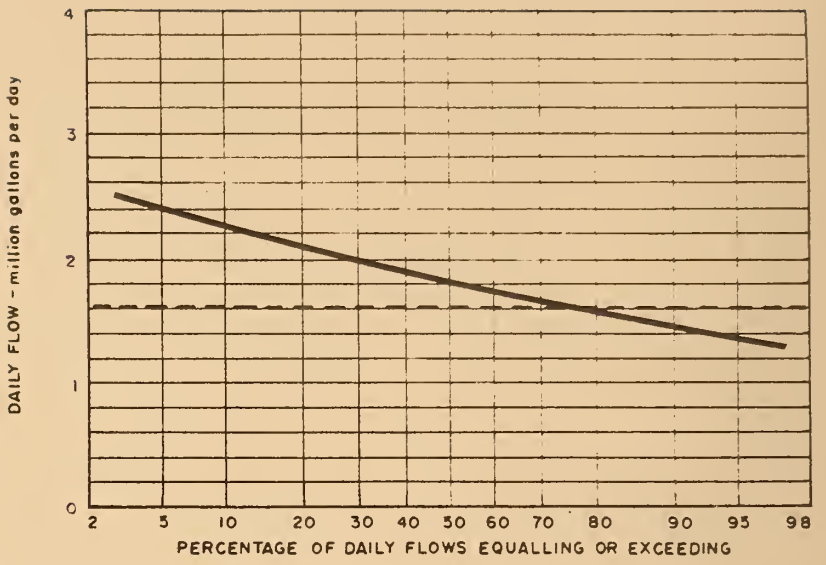
MONTH	TOTAL EXPENDITURE	REGULAR PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICALS	GENERAL SUPPLIES	EQUIPMENT	REPAIRS and MAINTENANCE	SUNDRY*	WATER	TRAVEL
JAN	3553.12	2640.64			578.29				288.95	7.60		37.65
FEB	5722.31	3013.40		275.93	551.89		48.45		200.65	1631.99		
MAR	7426.89	2832.29		265.61	589.40	1355.25	267.02	68.04	239.67	1756.51		53.10
APR	7321.45	3096.85		217.56	531.22	834.75	434.50		263.79	1942.78		
MAY	5840.01	2962.53		158.34	523.52	360.15	179.41	82.37		1505.14		68.55
JUNE	9409.77	4231.43	54.84	50.98	437.84	195.00	270.38	1321.74	1381.73	1465.83		
JULY	4300.71	60.20		210.81	515.97	1178.10	47.24	149.95	377.58	1717.81		43.05
AUG	7518.95	2837.88	312.21	130.89	460.47	531.00	201.12	1647.34	126.55	23.70	1247.79	
SEPT	5973.02	3062.41	517.09	150.87		(294.76)	160.45	245.13	125.84	1900.84		105.15
OCT	7624.01	3225.79	164.92	208.65	1486.25	336.30		228.25	287.90	1685.95		
NOV	13015.12	119.39		270.33	834.54	177.00	202.81		(5.82)	11416.87		
DEC	17497.41	11007.04	347.37	138.81	868.41	1212.83	432.34	25.91	800.08	1793.58	784.49	86.55
TOTAL	95202.77	39089.84	1396.43	2078.78	7377.80	5885.62	2243.72	3768.73	4086.92	26848.60	2032.28	394.05

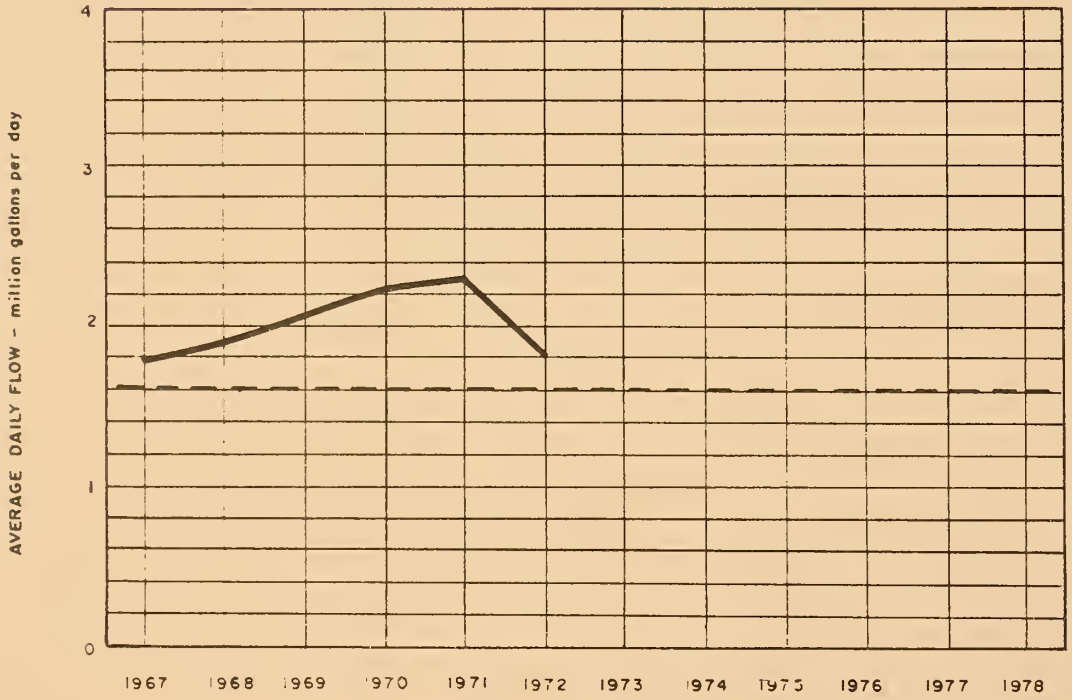
Brackets indicate credit.

* Sundry includes sludge haulage costs of $21,102.86

PROCESS DATA

FLOWS



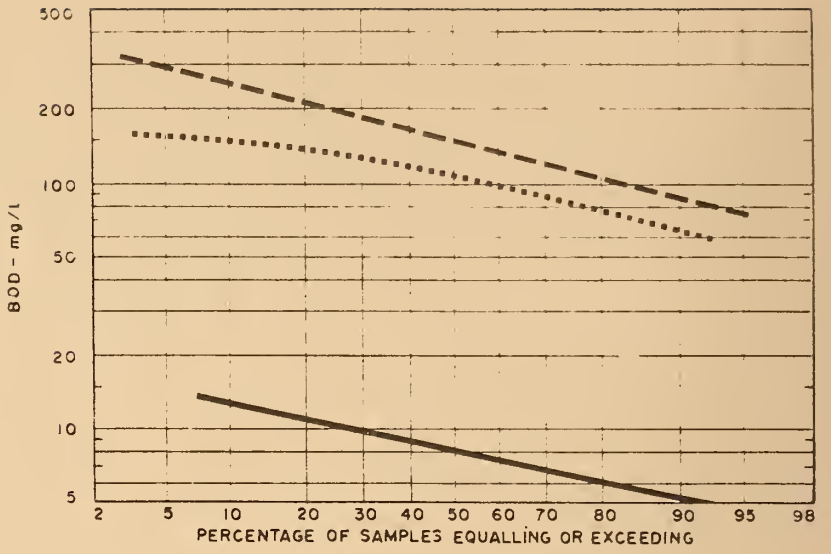


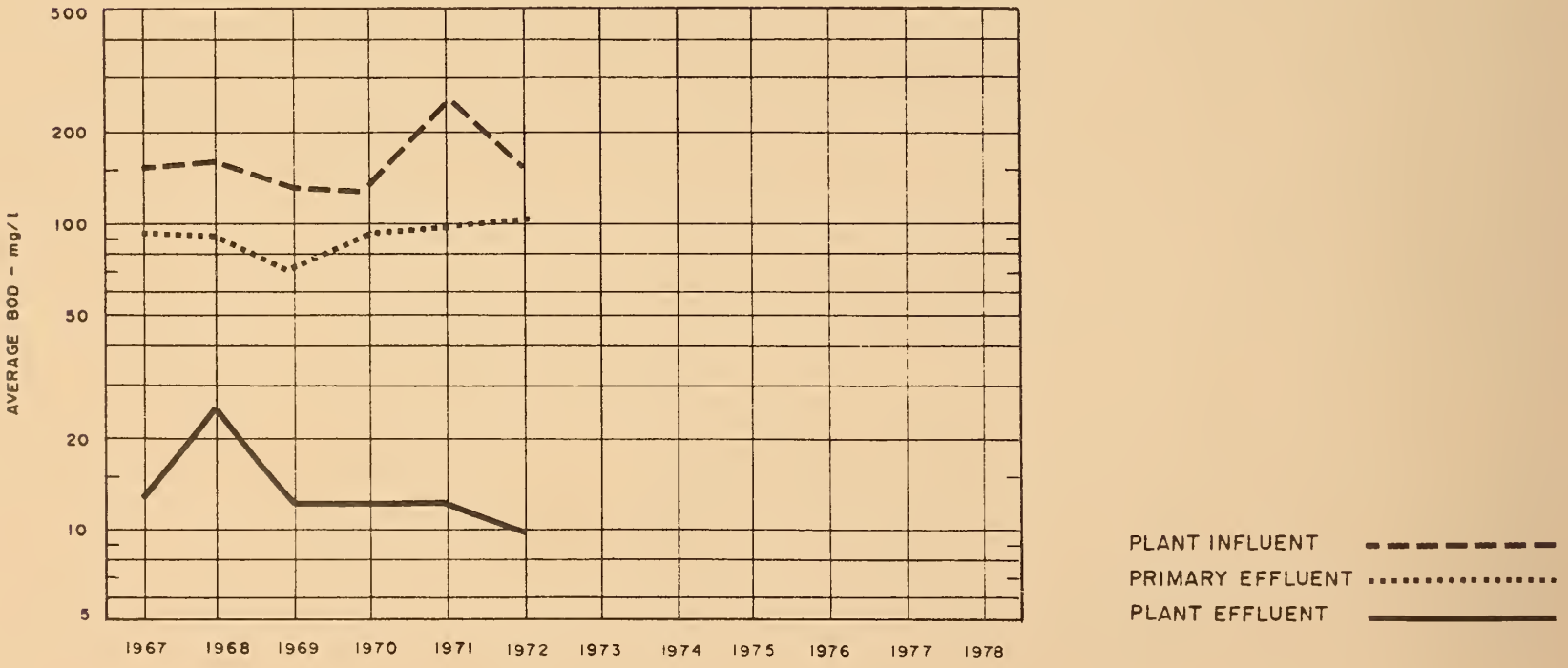
DESIGN CAPACITY _ _ _ _ _ _ _

PLANT PERFORMANCE

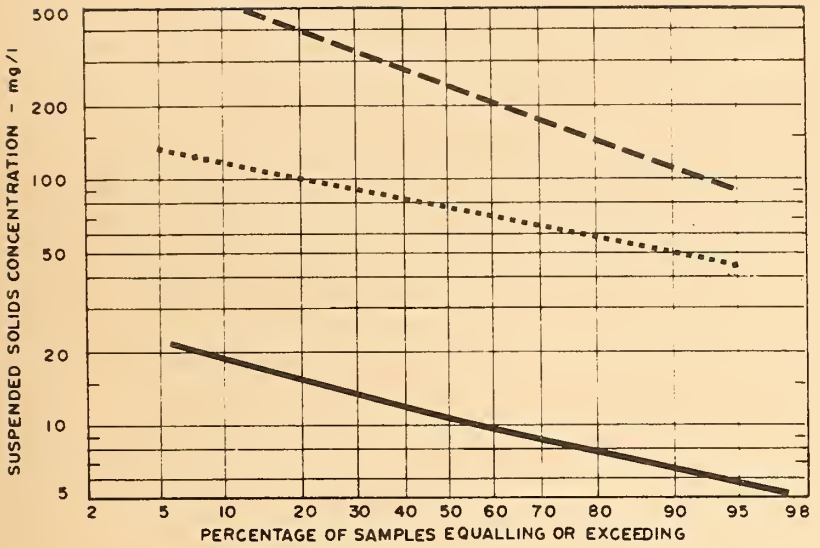
MONTH	FLOWS			BIOCHEMICAL OXYGEN DEMAND				SUSPENDED SOLIDS				PHOSPHORUS	
	TOTAL FLOW	AVERAGE DAY	MAXIMUM DAY	INFLUENT	EFFLUENT	REDUCTION		INFLUENT	EFFLUENT	REDUCTION		INFLUENT	EFFLUENT
	million gallons	mil. gal	mgd	mg/l	mg/l	%	10^3 pounds	mg/l	mg/l	%	10^3 pounds	mg/l P	mg/l P
JAN.	74.	2.4	2.7	155	8	95	109	242	10	96	173	10.0	5.0
FEB	50.	1.7	2.4	240	7	97	117	320	5	98	158	13.0	6.0
MAR	59.	1.9	2.2	120	17	85	60	170	12	93	93	9.2	3.9
APR	61.	2.0	2.1	120	11	91	66	210	8	96	123	7.5	2.8
MAY	54.	1.7	1.9	220	8	96	76	442	5	99	236	10.2	5.8
JUNE	49.	1.6	2.0	130	7	95	61	495	8	98	240	9.0	4.3
JULY	48.	1.6	1.9	70	10	86	29	140	20	86	58	6.7	4.4
AUG	48.	1.6	2.0	216	5	98	101	320	10	97	149	8.2	5.1
SEPT	48.	1.6	1.9	145	8	95	66	765	10	99	365	9.8	5.7
OCT	54.	1.7	2.0	200	5	98	104	150	5	97	78	10.0	5.4
NOV	57.	1.9	2.1	97	8	92	51	165	5	97	91	8.2	5.4
DEC	61.	2.0	2.6	145	11	92	81	240	13	94	138	10.8	5.6
TOTAL	663.	-	-	-	-	-	956	-	-	-	1902	-	-
AVG	-	1.8	MAXIMUM 2.7	156	9	94	80	306	9	97	158	9.6	4.9
No. of Samples	-	-	-	24	24	-	-	24	24	-	-	24	23

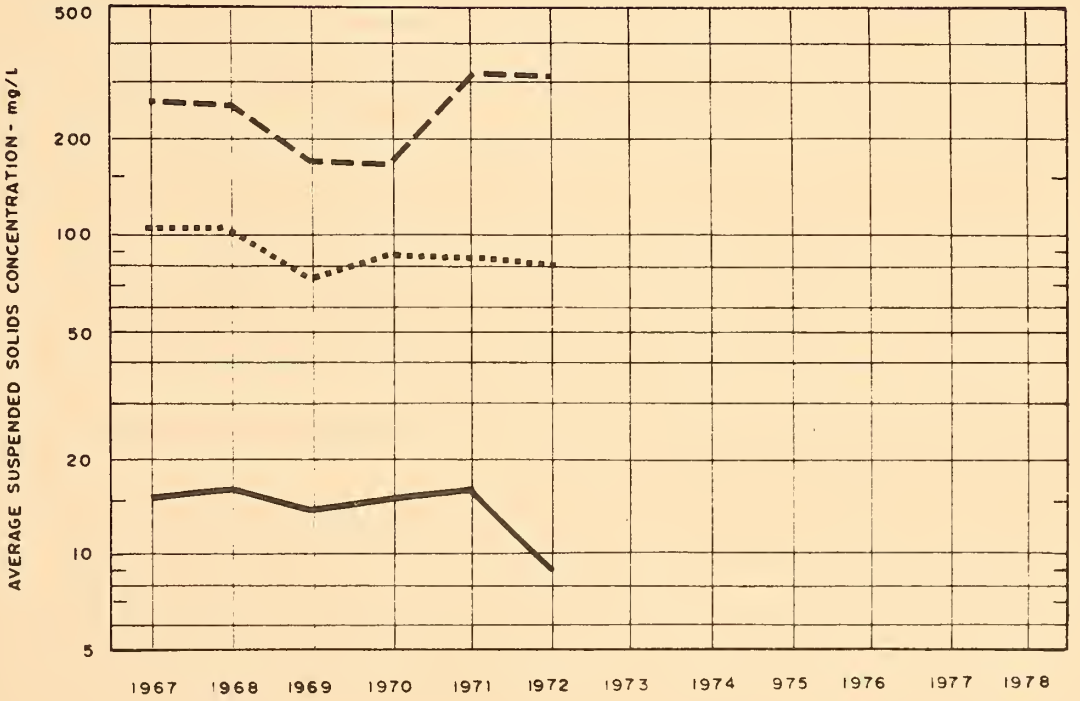
BIOCHEMICAL OXYGEN DEMAND





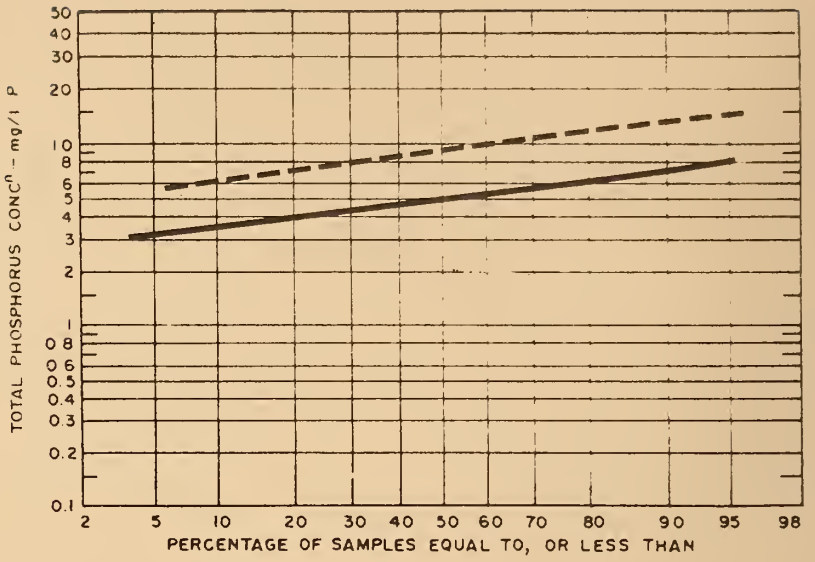
SUSPENDED SOLIDS

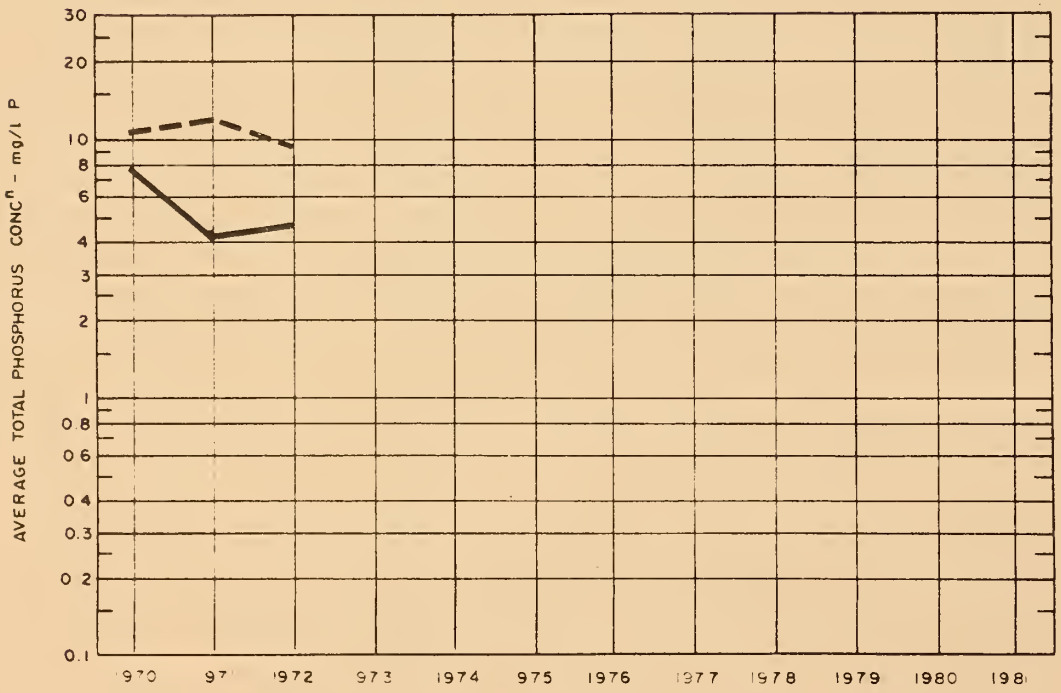




PLANT INFLUENT
PRIMARY EFFLUENT
PLANT EFFLUENT

PHOSPHORUS

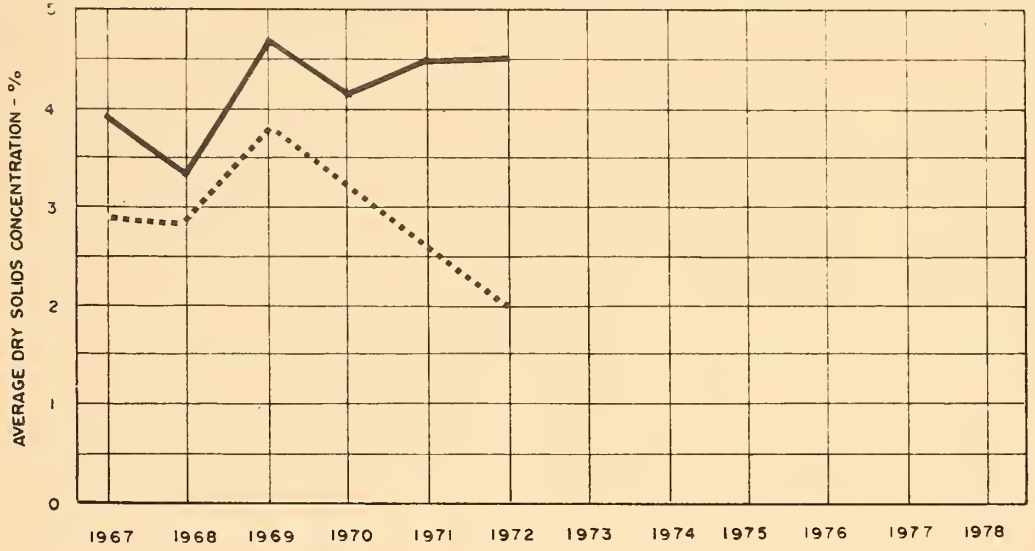




PLANT INFLUENT

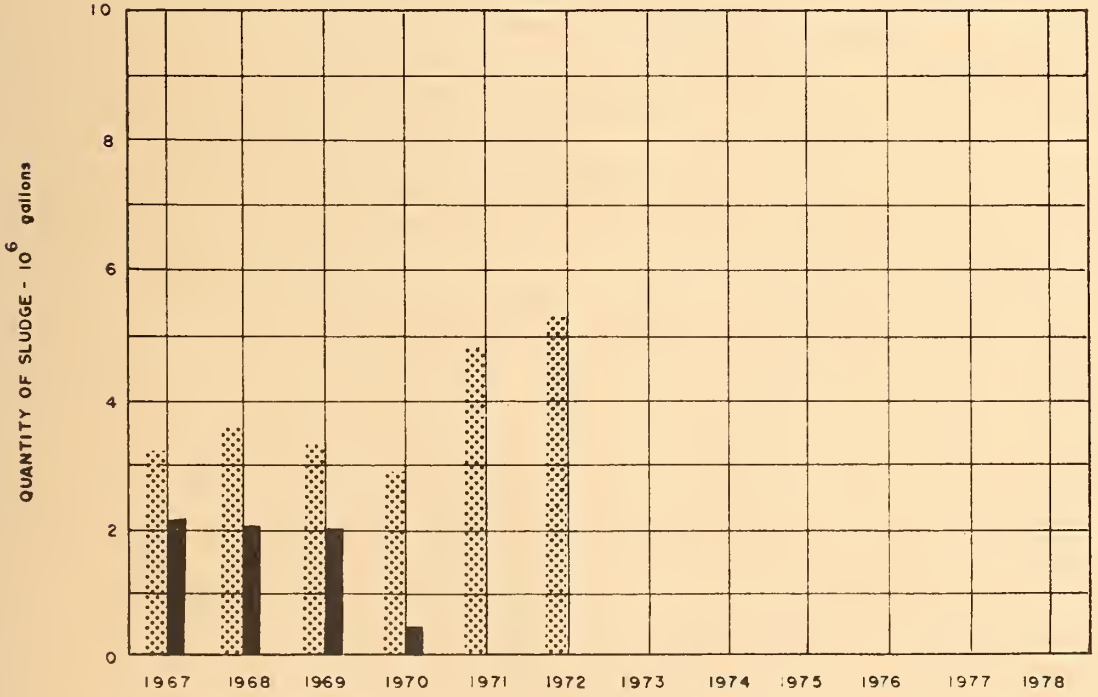
PLANT EFFLUENT

DIGESTION



RAW SLUDGE .....

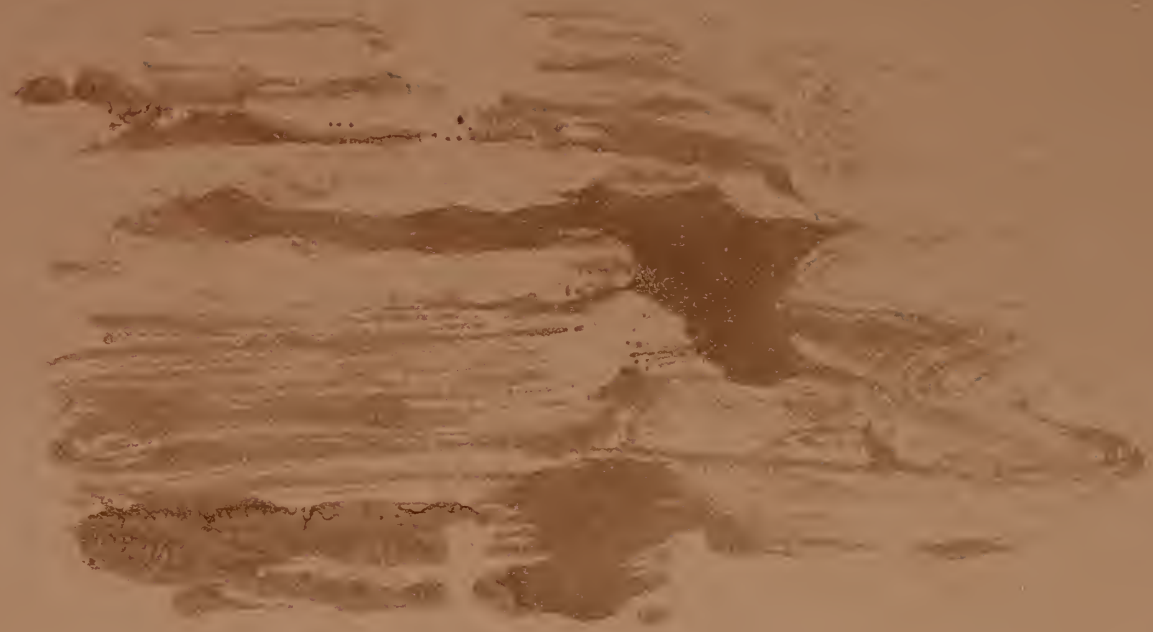
DIGESTED SLUDGE ——



RAW SLUDGE TO DIGESTER

DIGESTED SLUDGE REMOVED

TREATMENT DATA

MONTH	GRIT	CHLORINATION		PRIMARY EFFLUENT		AERATION			SLUDGE DIGESTION and DISPOSAL							
									RAW SLUDGE			DIGESTED SLUDGE			SUPER-NATANT	
	QUANTITY REMOVED cubic feet	Cl_2 USED 10^3 pounds	AVG. DOSE mg/l	BOD mg/l	SUSPENDED SOLIDS mg/l	MLSS CONC mg/l	F/M day^{-1}	AIR $\frac{1000\,ft^3}{lb\ BOD}$	QUANTITY 10^5 gallons	TOTAL SOLIDS %	VOL. SOLIDS %	QUANTITY 10^5 gallons	TOTAL SOLIDS %	VOL. SOLIDS %	T S. %	AMOUNT HAULED* cubic yards
JAN	125	6.0	6.7	117	95	1500	.38	1.2	4.2	7.7	93		3.2	72		1560
FEB	93	2.1	5.3	140	110	1600	.31	1.4	4.9	4.1	77		2.1	72		1919
MAR	104	3.6	6.0	113	77	1400	.32	1.6	4.4	3.0	72		1.6	69		1764
APR	109	3.6	6.0	77	65	1000	.34	2.4	3.0	5.2			2.1		.5	1230
MAY	98	3.3	6.2	50	65	1100	.16	5.9	2.4	4.5	68		1.9		2.1	1400
JUNE	100	3.2	6.5	100	90	1100	.30	2.0	4.5	5.0	69		2.1			1560
JULY	99	3.3	6.8	60	50	1200	.16	3.0	4.9	5.2	70		1.8			1530
AUG	107	3.3	6.8	103	57	1100	.31	2.6	4.6	4.1	69		1.9	65	2.3	1398
SEPT	117	3.2	6.7	113	105	1100	.35	2.3	4.5	4.5	68		2.6	59	1.9	1566
OCT	119	3.3	6.2	140	75	1400	.36	1.9	5.4	3.9	71		1.8	60	1.9	1821
NOV	114	3.3	5.8	87	85	1200	.29	2.9	5.1	3.1	77		1.6	63	1.5	1708
DEC	125	3.3	5.4	115	95	1000	.48	2.1	4.7	3.7	73		1.7	63		1296
TOTAL	1310	41.5	–	–	–	–	–	–	52.6	–	–		–	–	–	18752
AVG.	2.0 cu. ft/mil gal	3.4	6.3	101	81	1200	.31	2.4	4.4	4.5	73		2.0	65	1.7	1563

* From Holding Tank